12.0

Geologic, Seismic, and Soils Hazards

CITY OF SAN CLEMENTE GENERAL PLAN

12.0 GEOLOGIC, SEISMIC, AND SOIL HAZARDS

I. STATUTORY REQUIREMENTS

Government Code Section 65302(g) states the following:

> *The General Plan shall include a safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence and other geologic hazards known to the legislative body; flooding; and wildland urban fires.*

This section of the General Plan addresses geologic, seismic, and soils hazards.

II. OPPORTUNITIES AND CONSTRAINTS (ISSUES)

The City of San Clemente and its Sphere of Influence are located in an area of potential land sliding and slope instability, strong ground shaking, and liquefaction susceptibility. These geologic and seismic hazards can affect the structural integrity of buildings and utilities, and in turn cause severe property damage and potential loss of life.

The potential hazards affecting the City lead to a series of policy opportunities and constraints that need to be considered in the Geologic, Seismic and Soil Hazards Element of the General Plan. These issues include but are not necessarily limited to the following:

1. The adequacy of present engineering geologic and geotechnical/soils engineering controls on land development through specific technical standards, review procedures and zoning restrictions.

2. The extent to which development should be planned on the existing and proposed Sphere of Influence areas, and what type of development best fits the geologic and seismic conditions there.

3. Whether the City should perform an evaluation of specific "major" faults and potential liquefaction areas within the City and SOI areas in order to be proactive in the planning of further development in these areas.

4. Assess the need for an integrated evaluation of the potential impacts from a severe local earthquake on the critical, sensitive, and high occupancy facilities in the City due to the presence of geologic and seismic hazards.

5. Whether further actions (e.g., inventory, assessment) of unreinforced masonry and other high risk (to earthquake damage) structural types is needed.

6. Modification and adaptation of the existing Emergency Response Plan policies to an Earthquake Emergency Preparedness Plan which addresses such issues as 72-hour self-sufficiency, a "cache" of materials for rescue services, alternate routings for emergency vehicles, and evacuation routes in case of I-5 bridge failures.

7. The planning area contains pre-cast concrete buildings, soft story structures and non-ductile concrete frame buildings, that should be assessed to determine any possible need for seismic mitigation.

8. Local, State and Federal disaster preparedness resources and mobilization need to be coordinated with the existing San Onofre Nuclear Generating Station related emergency plans to assure adequate preparedness in the event of a major seismic event.

III. OVERVIEW OF SEISMIC, GEOLOGIC AND SOIL HAZARDS POLICIES

This portion of the Seismic, Geologic and Soil Hazards Element establishes goals, objectives, policies and implementation programs to provide for the protection of human life and the prevention of property damage from such hazards. The General Plan process will require a total commitment from the local legislative body in adoption of these policies to achieve the General Plan's goals and objectives. The policies stated in this section are intended to contain a direct relationship to the desired goals of the community and are the legislative tools that the local governments can utilize to achieve the vision for the community's future.

The Seismic, Geologic and Soil Hazards policies address the following:

1. Protecting human life and reducing damage resulting from fault rupture, slope instability, landslides and soils.

2. Preparing and maintaining an effective response system to a seismic event impacting the community.

3. Implementing effective seismic design standards.

4. Protecting human life and reducing community damage resulting from liquefaction in the City.

5. Continuing the functions of essential (critical, sensitive and high-occupancy) facilities following a disaster.

6. Minimizing major social and economic disruption potentially created by severe community damage.

7. Ensuring the community is adequately prepared for emergencies.

IV. GOALS, OBJECTIVES AND POLICIES

The following presents the goals, objectives, policies, and programs for geologic, seismic and soil hazards in the City. Implementing programs are contained in the following subsection. At the end of each policy is listed a capital "I" and number in parentheses which refers to the pertinent implementing program. Because the geologic, seismic and hazard policies are highly interrelated, they often apply to more than one objective. In these cases, the other objectives to which they pertain are listed within the parentheses at the close of each policy.

A. Geologic, Seismic and Soil Hazards

Goals

- Substantially reduce the potential level of death, injury, property damage, economic and social dislocation and disruption of vital services that could result from earthquake damage.
- Ensure the availability and effective response of emergency services following an earthquake.
- Prepare the City for effective response to, and rapid, beneficial recovery from, an earthquake.
- Ensure that non-seismic (geologic and soils) and seismic hazards potentially affecting areas for human use or habitation are properly mitigated or avoided prior to development.

B. Fault Rupture

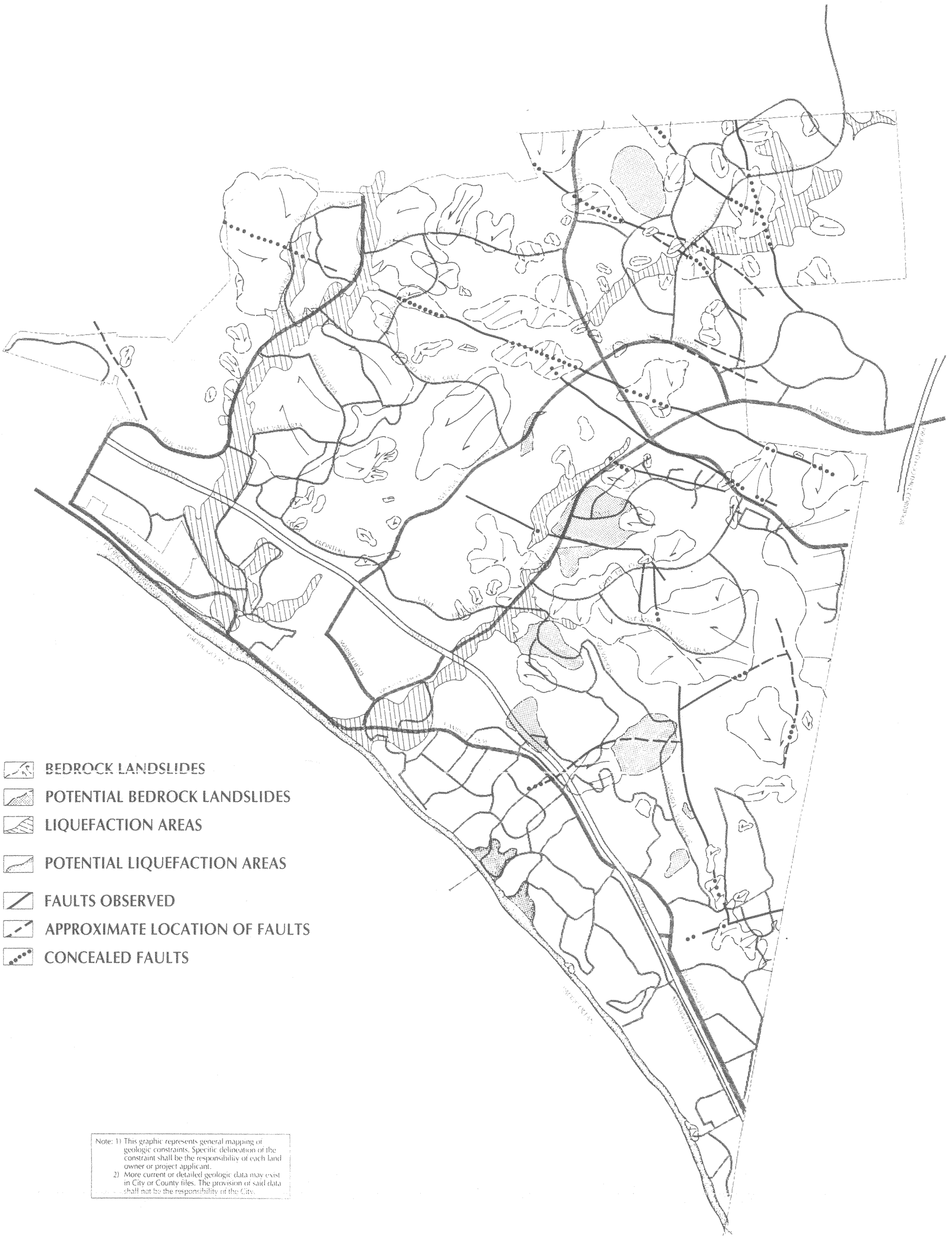
There are presently no known faults in the City or the sphere of influence (SOI) which have been demonstrated as potential fault rupture sources as depicted on Geologic Hazards Map **Figure 12-1**. However, the Mission Viejo and Cristianitos faults are of concern because they remain suspect. The City must remain aware that newly discovered evidence about faults in the City could change their activity status and dictate that fault rupture policies and programs become more important.

Objective

12.1 Protect life, safety, substantially reduce the damage from fault rupture, and help ensure orderly evacuation of building occupants following a seismic event.

Policies

12.1.1 Promote the collection of relevant data on fault location and history of fault displacement, as a basis for future refinement of fault zone policies. Faults with questionable activity levels generally located and shown on **Figure 12-1** of the Geologic Hazards Map with or without State and/or Federal assistance should be evaluated in conjunction with proposed development in these areas. Based on pre-development studies a determination will be made of limitations to be imposed (if necessary) on new development in these fault areas *(I 12.2, I 12.6, and I 12.23*).



Note: 1) This graphic represents general mapping of geologic constraints. Specific delineation of the constraint shall be the responsibility of each land owner or project applicant.
2) More current or detailed geologic data may exist in City or County files. The provision of said data shall not be the responsibility of the City.

SOURCE: Morton & Miller, 1981
U.S.G.S. Dana Point 1972 and San Clemente Quadrangle, 1975
California Division of Mines and Geology; Special Report 98 Plate 1
City of San Clemente Seismic Element, 1972.

NOTE: Areas designated with hazards are very approximate and not intended to be used for more than general planning. Site or area-specific studies would be necessary to assess the actual hazard potential.

GEOLOGIC HAZARDS

SAN CLEMENTE GENERAL PLAN

FEET 0 1,500 3,000 4,500

NORTH

FIGURE 12-1

12.1.2 Implement mandatory development restrictions and investigation requirements (by the state, under the Alquist-Priolo Act, or by the City), if active or potentially active faults are recognized within the City or SOI. Until such recognition, recommendations regarding fault hazard should be left to the discretion of the City's Engineering Geology Consultant *(I 12.1 and I 12.23).*

12.1.3 Require that any building intended to have occupancy be located at least 50 feet from either side of an active or potentially active fault *(I 12.3).*

C. Strong Seismic Ground Shaking

Earthquake sources outside the City and SOI have the potential to generate large seismic events and strong ground motions in the City and SOI. These large events may have a low likelihood of occurrence, but if one should occur, impacts to health, safety and property could be substantial.

Objective

12.2 Protect health and life safety, and reduce the level of potential property damage from the adverse effects of strong seismic ground shaking by implementing effective standards for seismic design of structures in the City, consistent with the state-of-the-art; and facilitate rapid physical and economic recovery following a damaging earthquake.

Policies

12.2.1 Adopt and maintain high standards for seismic performance of buildings, through prompt adoption and careful enforcement of the best available standards for seismic design. Assess building codes in use in the City to determine if they are sufficient for the moderate to high levels of ground shaking anticipated in proximity to major faults *(I 12.1, I 12.2, I 12.3, I 12.4, I 12.5, I 12.15, I 12.16, I 12.17, I 12.18, I 12.19, I 12.20, I 12.21, and I 12.22)*

D. Liquefaction

Potential liquefaction occurrence in the City and sphere of influence area (SOI) is primarily limited to the valley bottoms and the shoreline areas. Likelihood of occurrence is directly related to strong seismic ground shaking potential, when water is shallower than 50 feet and where sandy deposits are relatively loose and unconsolidated.

Objective

12.3 Protect life and essential lifelines and reduce the potential for property damage from liquefaction; and promote the collection of more complete information on liquefaction susceptibility throughout the canyon-bottom and shoreline areas of the City.

Policies

12.3.1 Require, in conjunction with proposed development, the determination of the liquefaction potential at sites generally located and depicted on **Figure 12-1** as liquefaction areas or potential liquefaction areas, and require that specific measures be taken, as necessary, to prevent or reduce damage in a seismic event especially to essential lifelines *(I 12.1, I 12.2, I 12.6, I 12.15, I 12.16, I 12.17, and I 12.24).*

12.3.2 Promote the collection and compilation of the most current data on groundwater levels and liquefaction susceptibility. The information should be used as a basis for identification of areas susceptible to liquefaction, and for modification, as necessary, of liquefaction related policies or *procedures (I 12.2, I 12.15, I 12.18, and I 12.19).*

12.3.3 Encourage the development of a means to identify and reduce the liquefaction potential of sites when structures currently exist *(I 12.15 and I 12.21).*

E. Slope Stability, Landslides and Soils

Landslides and potentially unstable slope areas are common within the city and less common in the SOI area. Policies are intended to require studies prior to any discretionary or non-discretionary permit approvals in order to provide developers with early warnings as to conditions which may later affect the permitting process as related to geologic, seismic and soil hazards.

Objective

12.4 Protect life, provide safety, and substantially reduce the potential level of property damage from landslides, mudflows, slope failures and soil hazards; promote the collection and utilization of more complete information on slope instability potential throughout the City.

Policies

12.4.1 Require, in conjunction with a proposed development project, the determination of landslide and slope instability potential and that pertinent measures be incorporated in the project design to mitigate this potential *(I 12.8, I 12.9, I 12.23, and I 12.25).*

12.4.2 Require an assessment of potential damage to essential lifelines (e.g., gas, water, electric, communication, and sewer) due to landslides and implement appropriate mitigation measures for proposed development projects *(I 12.8, I 12.9, I 12.24, I 12.25, and I 12.33).*

12.4.3 Evaluate, in conjunction with proposed development, all slopes with a greater than 25 percent grade for slope stability and erosion potential; include slopes less than 25 percent where liquefaction (lateral spreading) potential exists *(I 12.1).*

12.4.4 Review proposals for new development and expansions of existing development in areas, which are susceptible to

collapsible or expansive soils and require adequate mitigation of these hazards *(I 12.1, I 12.9, and I 12.25)*.

F. Critical, Sensitive, and High-Occupancy Facilities

These three types of essential facilities are shown on Figure 12-2 and defined within the City as follows:

a. "Critical facilities" are those facilities whose continued functioning is necessary to maintain public health and safety following a disaster and facilities where damage or failure could pose hazards to life and property well beyond their immediate vicinity. Examples include police and fire command and equipment centers, hospitals, and emergency shelters.

b. "Sensitive facilities" include facilities used for the manufacture, storage or sale of hazardous materials, as well as socially significant facilities such as schools, nursing homes, and housing for the elderly, handicapped, or mentally ill.

c. "High-occupancy facilities" are public or private structures for housing or assembly of large populations.

Objective

12.5 Ensure the continued functioning of essential (critical, sensitive and high-occupancy) facilities following a disaster; help prevent loss of life from the failure of critical and sensitive facilities in an earthquake; and help prevent major problems for post-disaster response, such as difficult or hazardous evacuations or rescue, large number of injuries, and major cleanup or decontamination of hazardous materials.

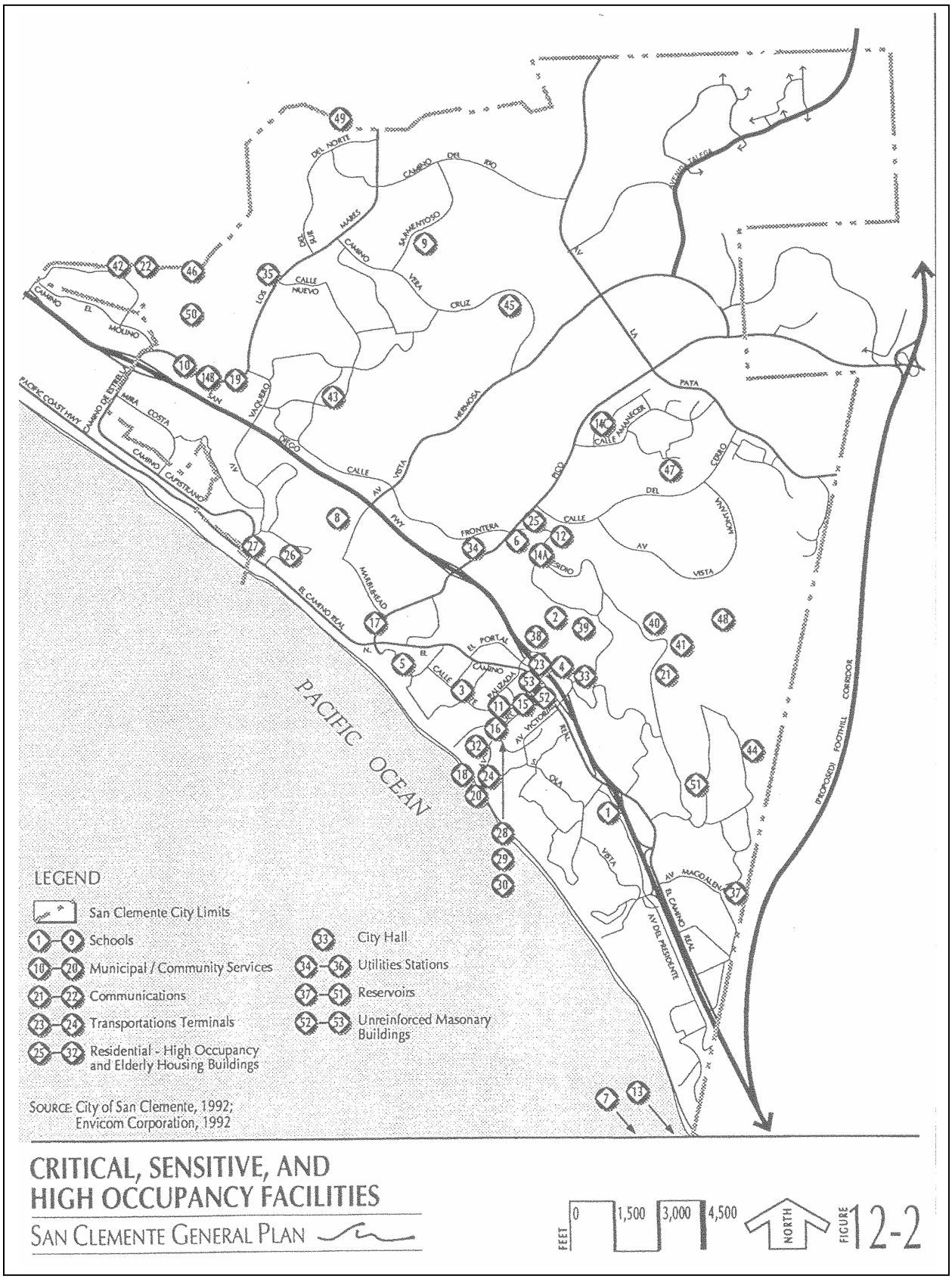
Policies

12.5.1 Require that earthquake survival and efficient post-disaster functioning be a primary concern in the siting, design and construction standards for essential facilities *(I 12.1, I 12.2, I 12.3, I 12.8, and I 12.10)*.

12.5.2 Require that proposed essential facilities be subject to seismic review, including detailed site investigations for faulting, liquefaction ground motion characteristics, and slope stability, and application of the most current professional standards for seismic design *(I 12.1, I 12.2, I 12.3, I 12.4, I 12.5, and I 12.19)*.

12.5.3 Prohibit the location of Critical Facilities within 150 feet of an active or potentially active fault unless determined by a qualified geologic engineer that a closer location will not result in undue risks based on detailed site *investigations (I 12.1, I 12.3 and I 12.5)*.

12.5.4 Prohibit the location of Sensitive and High-Occupancy facilities within 100 feet of an active or potentially active fault unless determined by a qualified geologic engineer that a closer location


PACIFIC OCEAN
PACIFIC COAST HWY
EL CAMINO REAL
AV PICO
AV VISTA HERMOSA
AV PATA
AV LA PATA
CALLE FRONTERA
CALLE NUEVO
CAMINO CAPISTRANO
CAMINO DE ESTRELLA
CAMINO EL MOLINO
CAMINO DEL RIO
CAMINO SAN MATEO
CAMINO VERA CRUZ
AV MACADAMIA
AV DEL PRESIDENTE
AV VICTORIA
CALLE PALIZADA
CALLE DE LOS MARES
CALLE DEL NORTE
CALLE LOS VACQUEROS
CALLE MIRA COSTA
CALLE PUESTA DEL SOL
CALLE VISTA MARBELLA
CALLE VISTA MONTALVO
CALLE VISTA DEL CERRO
CALLE VISTA DEL MAR
CALLE VISTA DEL OLA
CALLE VISTA DEL SOL
CALLE VISTA DEL PORTAL
PROPOSED FOOTHILL CORRIDOR
LEGEND
San Clemente City Limits
1–9 Schools
10–20 Municipal / Community Services
21–22 Communications
23–24 Transportations Terminals
25–32 Residential - High Occupancy and Elderly Housing Buildings
33 City Hall
34–36 Utilities Stations
37–51 Reservoirs
52–53 Unreinforced Masonary Buildings
SOURCE: City of San Clemente, 1992; Envicom Corporation, 1992
CRITICAL, SENSITIVE, AND HIGH OCCUPANCY FACILITIES
SAN CLEMENTE GENERAL PLAN
FEET 0 1,500 3,000 4,500
NORTH
FIGURE 12-2

will not result in undue risks based on detailed site investigations *(I 12.1, I 12.4, and I 12.5).*

12.5.5 Attempt to locate Critical and Sensitive structures in areas with continuous road access where utility services can be maintained in the event of an earthquake *(I 12.1 and I 12.15).*

12.5.6 Encourage owners of existing Critical and Sensitive Facilities with significant seismic vulnerabilities to upgrade, relocate or phase out the facilities as appropriate *(I 12.8 and I 12.11).*

12.5.7 Incorporate planning for potential incidents affecting Critical, Sensitive and High-Occupancy Facilities into the City's contingency plans for disaster response and recovery *(I 12.11).*

12.5.8 Encourage all existing essential facilities located in areas of potential geologic, seismic and soils hazards to maintain emergency response plans, with contingencies for all appropriate hazards *(I 12.8, I 12.29 and I 12.31).*

G. Hazardous Structures

Examples of hazardous structures includes: Unreinforced Masonry (URM) buildings, non-ductile concrete frame buildings; inadequately designed pre-cast/tilt-up construction; multi-story buildings with soft structures; inadequately designed structures with geometrical irregularities, mobile homes, residential buildings or other structures not properly secured to their foundations; dilapidated buildings; buildings with unusual interior and exterior nonstructural hazards; bridges, overpasses, tunnels; dams and water tanks.

Objective

12.6 Minimize to the greatest extent feasible the loss of life, serious injuries, and major social and economic disruption caused by the collapse of or severe damage to vulnerable structures (e.g., buildings, bridges, water storage facilities, key railroad components) in an earthquake.

Policies

12.6.1 Encourage the adoption of a program for the orderly and effective upgrading of seismically hazardous structures in the City for the protection of health and safety. Consider the adoption of a set of retrofit and upgrade requirements patterned after the State of California URM Law (SB547) *(I 12.10, I 12.11, and I 12.12).*

12.6.2 Consider the definition of procedures for seismic review of other potentially hazardous structures in the City at appropriate points in the structures history *(I 12.13 and I 12.34).*

H. Emergency Preparedness

Objective

12.7 Provide effective response in a disaster, for life-saving and the curtailment of property damage and social dislocation; enhance emergency preparedness through maximum integration with the San Onofre Nuclear

Generating Station (SONGS) related emergency plans, community education and self-help programs; and minimize to the greatest extent feasible serious damage and injuries through effective hazard mitigation.

Policies

12.7.1 Promote coordination between City agencies, City residents and the business community to enhance preparedness through mutual responsibility *(I 12.7, I 12.26, I 12.27, I 12.28, I 12.29, and I 12.30).*

12.7.2 Incorporate three phases into the City's emergency prepared-ness program; hazard mitigation, disaster response and self-sufficiency/mutual support of residents, business and industry (*I 12.7, I 12.26, I 12.27, I 12.28, I 12.29, and I 12.30).*

12.7.3 Periodically monitor the appropriateness and effectiveness of the City's disaster response plans and update these as necessary *(I 12.26, I 12.27, I 12.28, and I 12.29).*

I. Post-Disaster Reconstruction

Objective

12.8 Encourage preparation of a plan to facilitate the rapid and effective recovery of the City following an earthquake; identify potential for alternative sources of financing of damage repair and reconstruction.

Policies

12.8.1 Consider the development of programs, options, and procedures to promote the rapid reconstruction of the City following an earth-quake, and to facilitate a specific upgrading of the community environment, as opportunities allow; emphasize coordination with appropriate public agencies and private entities *(I 12.14 and I 12.34).*

12.8.2 Establish the mitigation of earthquake hazards as a high priority for City programs, both before and after an earthquake *(I 12.1, I 12.3, I 12.4, I 12.5, I 12.6, I 12.10, I 12.14, I 12.16, I 12.17, I 12.18, I 12.18, I 12.19, I 12.20, I 12.21, I 12.22, I 12.23, I 12.24, I 12.30, I 12.32 and I 12.34).*

V. IMPLEMENTATION PROGRAMS

The following lists the programs which implement the geologic, seismic and soil hazard policies contained in the preceding sub-section of this element. The capital "I" and number preceding each program are referenced by the policies that they implement.

A. Zoning and Building Codes

I 12.1 The building, zoning and grading codes shall be reviewed, and amended as appropriate for incorporation of standards modified by the policies herein or the (a) siting, seismic design, and review of Critical, Sensitive and High-Occupancy Facilities; and (b) review of slope stability and soil hazards for new developments prior to discretionary review as background.

Responsibility City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review and modify, where appropriate, the building, zoning and grading codes within 12 months of General Plan adoption or as funding permits.

I 12.2 Detailed site specific studies for ground shaking characteristics, liquefaction potential (only in areas defined as being susceptible to liquefaction as shown in Figure 12-1), and fault rupture potential shall be required prior to discretionary review as background to the development/approval process for Critical, Sensitive and High-Occupancy Facilities.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: Public Initiated: City of San Clemente General Fund.

Private Initiated: Development application fees.

Schedule: Ongoing as project applications are submitted or as funding permits.

I 12.3 Zoning regulations shall be amended to prevent Critical Facilities from being located within 150 feet of an active fault identified by the City's database or from field investigation. This distance may be modified if it is determined by a qualified geologic consultant that no adverse risk would occur based on field surveys, borings, and other relevant data and analysis. Any building intended for human occupancy shall be constructed greater than fifty feet of either side of an active or potentially active fault.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund.

Schedule: As required with the identification of new geologic data or as funding permits.

I 12.4 Sensitive and High-Occupancy Facilities shall not be allowed within 100 feet of either side of an active or potentially active fault. This distance may be modified if it is determined by a qualified geologic consultant that no adverse risk would occur based on field surveys, borings, and other relevant data and analysis.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: Development application fees.

Schedule: Ongoing as project applications are submitted.

I 12.5 Fault activity investigation reports shall have a standard format developed through consultation among the California Division of Mines and Geology, the City's Engineering Geology Consultant and relevant City Departments (e.g., Planning, Engineering, Building). An agreed upon design earthquake shall be formulated by this group for the San Andreas, Elsinore, and Offshore Zone of Deformation faults and utilized in the reports to determine ground shaking potential. Reports shall be reviewed for adequacy by the City's Engineering Geology Consultant. At such time, the City's Sphere of Influence is annexed, the City (Planning and Engineering) shall require that areas planned for development within 500 feet of the Mission Viejo and Cristianitos faults be studied to document evidence on age of last movement.

Responsibility City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Update master geologic file with new field data annually or as funding permits.

I 12.6 All construction excavations and trenches of five feet or deeper, created in conjunction with human occupancy structures and public works infrastructure, shall be inspected by the City's Engineering Geology Consultant for any evidence of faulting if the subject property is identified as lying within 500 feet of the mapped zones of the Mission Viejo and Cristianitos faults in previous soils, or geologic reports conducted for subject sale.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: Private development funds.

Schedule: Ongoing as funding permits.

I 12.7 Public participation shall be sought in the development of hazard mitigation and disaster recovery programs.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Ongoing as hazard mitigation and disaster recovery programs are developed and as funding permits.

B. Existing Hazards: Critical Facilities

I 12.8 Existing City-owned, City-leased or City-rented Critical, Sensitive and High-Occupancy facilities shall be reviewed for any significant siting, design or construction problems that would make them vulnerable in an earthquake. The findings shall be incorporated into emergency operations plans as well as addressed in longer-term programs of facilities upgrading or relocation.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review siting, design and construction of critical, sensitive and high-occupancy facilities within two (2) years of General Plan adoption or as funding permits.

I 12.9 Developers shall be responsible for supplying a preventative maintenance program for all manufactured (cut and fill) slopes. The City shall consider implementation of a developer-sponsored 10-year slope failure warranty requirement. Inspection and maintenance including grading, planting and irrigation, of slopes during this period will be provided for in association fees and CC&R's.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: Funds from development applicants.

Schedule: As necessary or as funding permits.

C. Hazardous Buildings

I 12.10 A data base shall be compiled at the earliest opportunity on all unreinforced masonry and other structural types which may be considered as potentially seismically hazardous in the City.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Ongoing as the inventory needs maintaining or updating, or as funding permits.

I 12.11 Consider the adoption of an ordinance for the upgrading of seismically hazardous structures which would include priorities for the sequence of enforcement; structural standards for seismic upgrading; options or requirements for early anchoring of buildings, to provide an initial level of reinforcement at an early stage of seismic retrofit; incorporation of concepts and provisions of the State Code for historic buildings, to provide additional flexibility for preservation of historic buildings while protecting them from significant earthquake damage; a time schedule for enforcement; and procedures for the posting and maintenance of warning signs on hazardous structures.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review and modify, where appropriate, the building, zoning and grading codes as funding permits.

I 12.12 A special recognition program for buildings that have been reinforced under the hazardous buildings ordinance shall be considered, such as a plaque or certificate that can be displayed on or in the building.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Evaluate the merits of program within 24 months of General Plan adoption or as funding permits.

I 12.13 Maintain an awareness of other types of structures which may be considered by engineers, over time and through state-of-the-art changes to be seismically hazardous and develop programs for the reduction of these seismic hazards. For example, the City may consider the modification of

the current ordinance to require concrete tilt-up and concrete frame buildings built before enactment of the current seismic codes to meet basic seismic standards before a change in use or occupancy level is approved, or when significant alteration or repair is proposed.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Evaluate the merits of establishing a program within 24 months of General Plan adoption or as funding permits.

I 12.14 Special structural reviews shall be conducted on any multi-story or concrete buildings receiving significant damage in an earthquake, prior to their repair or demolition. Structural review would be the responsibility of the owner.

D. Liquefaction

I 12.15 Require the preparation of a liquefaction report for proposed projects located in liquefaction susceptibility zones. Liquefaction reports shall be prepared prior to preparation of development plans or tentative tract maps. These reports will be utilized to help assure that adequate liquefaction mitigation is possible, and that the proposed mitigation is built into the initial project layout and design.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or development application fees.

Schedule: Ongoing as project applications are submitted.

I 12.16 Liquefaction susceptibility and fault zone designations and related land-use and construction policies shall be reviewed and updated periodically to reflect current information and technology.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review and modify, where appropriate, liquefaction susceptibility and fault zone designations as current data and technology becomes available or as funding permits.

I 12.17 Request the California Division of Mines and Geology or the U.S. Geological Survey to perform an initial study to define the groundwater levels in areas where liquefaction potential is estimated to be high. For areas of very high groundwater (within 30 feet of the ground surface), the City shall consider the appropriateness of requiring potential developers in these areas to investigate means of lowering the groundwater level, and consider appropriate programs to that end.

Responsibility: City of San Clemente Department of Community Development in cooperation with the California Division of Mines and Geology or U.S. Geological Survey.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Groundwater study shall be updated every five (5) years or as funding permits.

I 12.18 High groundwater problems related to any old, improperly abandoned water wells shall be mitigated by the current owner wherever possible, through use of proper sealing and abandonment procedures.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: Property owner/developer funds.

Schedule: Ongoing as wells are discovered or as funding permits.

I 12.19 Ensure the community has an adequate information base on the level and extent of the City's water table. Require project proponents to conduct water resource analysis should data prove to be insufficient.

Responsibility: City of San Clemente Department of Community Development in cooperation with a consulting geologists/engineer.

Funding Source: City of San Clemente General Fund and/or any other available funding sources approved by the City.

Schedule: Ensure the City has adequate information within 12 months following General Plan adoption or contract a consulting firm to provide detail information of the City's water resources within 24 months or as funding permits.

E. Building Codes and Review Procedures

I 12.20 Seismic revisions to the State Uniform Building Code shall be reviewed and implemented in the City's Building Code.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review and modify, where appropriate, the building, and grading codes on an on going basis as funding permits.

I 12.21 The City's building and grading codes shall be modified to reflect investigation requirements for designated potential liquefaction zones. A liquefaction susceptibility investigation shall be required for Critical Facilities, Sensitive Facilities, High-Occupancy Facilities, and buildings with more than three stories or more than 6,000 square feet in foundation area. Studies for all other human occupancy buildings should be at the discretion of the City Engineer and the City's Engineering Geology Consultant. Liquefaction susceptibility zones within the City.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Review and modify, where appropriate, the building, and grading codes within 18 months of General Plan adoption or as funding permits.

I 12.22 Review the current building code enforcement procedures for concrete tilt-up and composite pre-stressed concrete construction for consistency with effective principles of seismic design, and revise as appropriate to maintain the seismic integrity of new construction.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Revise, where appropriate, the building code enforcement procedures for consistency within 24 months of General Plan adoption or as funding permits.

I 12.23 Effective review of seismic design for proposed Critical, Sensitive and High Occupancy Facilities and buildings of four stories or more in height, or 6,000 square feet or more in ground level floor space shall be conducted by City-retained structural engineers or through third-party review (paid for by the developer) by qualified engineers responsible to the City Engineer.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or development application fees.

Schedule: Ongoing as project applications are submitted or as funding permits.

I 12.24 A central repository shall be established in the Engineering Department, for the collection and compilation of geologic and soils engineering information related to faults and fault zone studies, groundwater levels, soils characteristics, susceptibility to landslides and liquefaction, and other data as appropriate. This information shall be used to increase the knowledge and insights of City reviewers and applicants alike, in support of hazard mitigation.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Establish geologic repository immediately following General Plan adoption and update as necessary or as funding permits.

I 12.25 All geologic and soils reports submitted to the City shall be reviewed for their adequacy and completeness by a qualified, Certified Engineering Geologist and/or Registered Soils Engineer.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or development application fees.

Schedule: Ongoing as project applications are submitted and as funding permits.

F. Emergency Preparedness

I 12.26 Appropriate disaster response and earthquake response plans shall be maintained and updated.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Annually review the "appropriateness" of plans and modify when necessary or as funding permits.

I 12.27 Disaster response plans shall include adequate capabilities for heavy search and rescue, major medical response, interim morgue, emergency shelter, traffic and utility impacts, debris removal and disposal, as well as hazardous materials response for any chemicals stored or used in or adjacent to the hazardous buildings. Disaster response plans shall also include procedures for access, traffic control, emergency evacuations, and security of damaged areas.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Annually ensure program includes at a minimum items listed above as funding permits.

I 12.28 Maintain effective mutual aid agreements with other agencies and/or municipalities for fire, police, medical response, public works, building inspection, mass care, and heavy rescue.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Ongoing as necessary or as funding permits.

I 12.29 Emergency response exercises shall be conducted by the City and in cooperation with other pertinent agencies. Exercises shall be designed to test and upgrade various disaster response plans.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

S*chedule:* Exercises shall be conducted at least every two (2) years or as funding permits.

I 12.30 A program of public education and preparedness shall be a major, continuing component of the emergency preparedness program. It should include, at a minimum:

a. the existence and approximate locations of major regional and local faults, landslide and liquefaction susceptibility areas;

b. the potential for strong ground shaking in the area, and means of strengthening buildings and protecting furnishings, equipment and other building contents from damage;

c. the need for businesses and residents to be self-sufficient for several days following an earthquake, including food, water, medical assistance, and limited fire-fighting;

d. specific information describing what an individual should do during and immediately following an earthquake, whether at home, in a car, at work, or in an unfamiliar building.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Annually ensure program includes at a minimum items listed above as funding permits.

I 12.31 Solicit the cooperation of the business community for public education and mutual assistance. Businesses shall be encouraged to develop their own disaster response plans and have provisions for food, water, first aid and shelter of employees who may not be able to return home for several days following a major earthquake.

Responsibility: City of San Clemente Community Development and Fire Departments in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Ongoing as funding permits.

G. Planning for Post-Disaster Recovery

I 12.32 A standing in-house Disaster Recovery Committee shall be maintained to provide contingency planning for the rapid and effective reconstruction of the City following a disaster. The committee shall include representatives of Planning, Public Services, Community Development, Building, and Engineering, Fire and Police policy functions, as well as liaison to the local utilities and any State and Federal redevelopment, housing, and/or reconstruction programs, and other functions as necessary. Responsibilities would include the definition of procedures for post-disaster damage assessment as required for obtaining State and Federal assistance and specific recovery planning; review of damage patterns and development of specific plans for post-disaster reconstruction, including programs for effective recovery of lifelines, housing, and the commercial viability of the community; and development of procedures for rapid

determination of locations where significant damage is caused by inherent geologic or structural problems that must be corrected to prevent recurring damage (high hazard areas).

Responsibility: City of San Clemente Department of Community Development in cooperation with the other appropriate City departments.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Annually review the "appropriateness" of plans and modify when necessary or as funding permits.

I 12.33 If the Disaster Recovery Committee determines that there are potentially high hazard areas within the City, procedures shall be developed for obtaining appropriate professional review of these areas, and specific recommendations for hazard mitigation.

Responsibility: City of San Clemente Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Develop review procedures and specific recommendations as necessary or as funding permits.

I 12.34 Guidelines shall be developed by the Disaster Recovery Committee, which provide a clear direction for the exercise of authorities following an earthquake related disaster for such purposes as:

a. rapid designation of redevelopment areas;

b. revision of land use, circulation and parking requirements, and institution of other programs for improving the community environment;

c. adaptation and institution of special programs for disaster recovery;

d. funding of disaster recovery measures;

e. moratoria on reconstruction in any high-hazard areas where damage could be repeated in after shocks or in future earth-quakes;

f. upgrading of the building code if deficiencies are believed to exist;

g. establishment of Geologic Hazard Abatement Districts, as appropriate; and

h. designation of sites for temporary housing (e.g., travel trailers and prefab construction) of households made homeless in the disaster, in

cooperation with the Disaster Housing Program of the Federal Emergency Management Agency.

Responsibility: San Clemente Disaster Recovery Committee in cooperation with the Department of Community Development.

Funding Source: City of San Clemente General Fund and/or other available funding sources approved by the City.

Schedule: Within 24 months of General Plan adoption or as funding permits.

VI. GLOSSARY

A. Active Fault	-	A fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side; has exhibited surface displacement within the Holocene time (approximately the past 11,000 years).
B. Bedrock Landslide	-	The falling or sliding down of a mass of earth and/or rock which cuts at the underlain solid rock foundation.
C. Critical Facility	-	Facilities that either provide emergency services or house or serve many people who would be injured or killed in a case of disaster damage to the facility. (e.g. hospitals, emergency service, communication and utility facilities).
D. Erosion	-	The process by which soil and rock are detached and moved by running water, wind, ice and/or gravity
E. Flooding	-	A rise in the level of a water body or the rapid accumulation of runoff, including related mudslides and land subsidence, that result in the temporary inundation of land that is usually dry.
F. Ground Failures	-	Mudslide, landslide, liquefaction or soil compaction
G. High Occupancy Facility -	-	A public or private facility for housing or assembling large populations.
H. Landslide	-	A general term for a falling mass of soil or rocks.
I. Liquefaction	-	A process by which water-saturated granular soils transform a solid to a liquid state during strong ground shaking.

J. Potentially Active Fault	-	A fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side; shows evidence of surface displacement during Quaternary time (the last 2 million years)
K. Seiche	-	An earthquake-induced wave in a lake, reservoir, or a harbor
L. Sensitive Facility	-	A facility used for the manufacture, storage or sale of hazardous materials as well as schools, nursing homes and housing for the elderly, handicapped or mentally ill.
M. Subsidence	-	The gradual, local settling or sinking of the earth's surface with little or no horizontal motion (subsidence is usually the result of gas, oil, or water extraction, hydrocompaction, or peat oxidation, and not the result of a landslide or slope failure.
N. Surface Rupture	-	A break in the ground's surface and associated deformation typically resulting from the movement of a fault.
O. Tsunami	-	A wave, commonly called a tidal wave, caused by an underwater seismic disturbance, such as sudden faulting, landslide, or volcanic activity.